SHUTTLE BUS RETROFITS WORKSHOP

Opening remarks and retrofit grants

- Retrofit Grant has grown from 500K to 1.5M
- 'Notice of intent' not required to be eligible

Questions:

What are examples of verified technology grant?

- Add on technologies i.e. bio-diesel, emulsified diesel, oxidation catalyst
- There are many companies with similar products but different performance
    - Go to www.epa.gov/otaq/retrofit - click on verified products

MASCO Fleet

- Largest supplier of alternative fuels in the country (Liquid natural gas buses)
- Introducing bio-diesel shortly
- Add on technologies (i.e. nano-fuels)
- Very expensive to maintain diesel boxes
- MASCO wanted to clean up air and wanted to have some prices on natural gas
    - Facility costs- all operating costs had to be built in
    - Issues with CNG;
        - Horrible on idle; no benefit of CNG on low diesel
        - The mileage was horrendous
        - Airport environment is best environment for CNG
        - Speed of that service is best for natural gas
        - Natural gas is 35K – 40K more than diesel engine
        - Not a large customer base

Questions:

Is MASCO getting away from CNG from fleet?

- Absolutely not! New technologies coming out to deal with diesel

Is MASCO more comfortable with durability of CNG?

- Can't get diesel type warrantee on CNG
- You have to absorb the costs

All buses purchased with traps?

- Warrantee goes along with engine
- Comlands retrofit; they haven't any problems with the traps

Any cold weather issues this winter? Any problems with traps or filters?

- No, liken to #1 Kerosene engines
- "beautiful" fuel

MASCO experience been with large buses, can you speak to smaller vehicles?

- Finding (w/ EPA) manufacturers of smaller buses

  - Problem raising engine temperature increasing NOX
  - Ties closely with electronics in the engine
  - Getting manufacturer to work with you is difficult
  - Market not there for smaller vehicles (i.e. 5.9 liter technology)
- Before you do a retrofit? Compare exhaust temperature and see what they need based on data logging

Did you do any kind of fuel economy evaluation pre- and post- after treatment?

  - Buses are old so making comparison is difficult
  - Difference in fuel economy is marginal

Harvard University Fleet (Presentation)

- Compressed natural gas *was* the main technology out there
- Bio-diesel is the main topic today
- Why did they look into alternative fuels three years ago?
  - Global warming; rising sea level, drought etc.
  - Urban Air Pollution
- In particular for Harvard, why use alternative fuels?
  - 3 years ago, it was voluntary and non-regulatory
  - Town Gown—Cambridge/Boston
  - Supports the Mission of Harvard's Green Campus initiative; small part of the overall green campus initiative
  - It's fun!
- What are the options?
  - Would we go the way of fossil fuels; gasoline, diesel, compressed natural gas (CNG) liquefied gas
  - Ethanol
  - Bio-diesel
  - Greenhouse gases, regulated emissions, and energy use in transportation
- Highest GHG emissions/mile per passenger car;
  - Gasoline highest
  - BD100 lowest
- Website: www.biodiesel.org
- **IMPORTANT:** Made decision to go bio-diesel but didn't have fuel deliver system on site had to install on site
- Final product; 2K gallons, all meets code, fire suppression system, spill control, fuel access 24/7
- Cost analysis: vehicles retrofitting $0; Site plans $2,500; 2K gallon ConVault tank $9,450; Fuel Management $5,850 etc.
- Saving money with fuel on site
- What have we learned?
  - Positive community feedback from community and peers
  - Really does smell better!
  - Bio-diesel does perform well in **cold Weather**! No vehicles froze up of gelled
  - Engine warrantees not at risk from Caterpillar or Mercedes

- Limited suppliers
- Cost benefits to on-site fueling
- On-going analysis- Oil testing, emission, vehicle maintenance

Questions

Does it really smell like French fries?

- Yes, at first it cleans out old gunk in the engine

Advertised as a 10% loss in efficiency?

- Hard to compare Jan. Feb. between March and April
- Tested two vehicles and found 5.2 compared to 5.1 miles to the gallon
- Using 20% bio-diesel 80% diesel

Are you going to use full blend for the summer i.e. B100?

- No, may try 50/50 mix
- But if you use B100 you might have problems in the winter
- Example, Keane State College, Keane, New Hampshire uses B100 in summer and have had great success with it

Any injection problems?

- Not that he's aware of, no issues with engines, caterpillars that ran them etc.
- No issues but upped cycle with fuel filters; changed more regularly

Cost difference between wholesale?

- Don't procure enough fuel to lock in contract
- Keeps going up for B20
- Diesel is going for $169.9 if bought in bulk
- Buying 180 gallons/year

BTU in Bio-diesel in the B20 versus regular diesel?

- Unknown off the top of his head

Other Emission Reducing Initiatives: NESCAUM

- Will be discussing project in Brooklyn
- Will speak a bit about program, project partners, project history and next steps etc.
- Two sources of emissions; oil breather tube and out the tail pipe

Questions:

When you have an aging fleet do you invest in retro-fitting or do you re-power or buy new ones?

- Need to look at the vehicles themselves; condition of vehicles were in good shape
- When to re-power, rebuild or refit is a difficult question
- Most don't have the option of buying a new vehicle
- Vehicles run on regular diesel not ultra low diesel

Boston Coach

- Ultra low sulphur diesel
- No diesel engine is designed to idle
- Hardest people to convince in the mechanic and driver; they don't want to turn off engine for fear it will stall
- Difficult to implement because mechanics hard to change ideas
- Went to a 0 idling policy

Questions

Set out to educate the drivers and mechanics, what idling did to the engine and will start losing heat?

- You lose compression
- No engineer designs a diesel bus to idle
- Did many classes, took 2 years to get total buy in
- Cheaper to run a clean bus versus a dirty bus
- Saves on fuel, filters etc.
- Tried to go to a total electronic fleet; job is to have 0 emissions

Did you offer any kind of incentives to drivers etc.?

- No incentives given, didn't threaten discipline right off the bat
- Presented as citizens of this community, part of the solution not part of the problem
- No disciplinary action done

What are the savings?

- Hard to say… had to slow the mechanics down, they were working too fast and missing things
- Roughly around 20%
- 80% scheduled maintenance (good)

What is your cold weather policy? When engines are off do they freeze?

- If you're going to make a 15 break then shut it off but allow them to run for 5 minutes

Where do you store your buses?

- Outside, no trouble starting the buses in the morning
- Operators stop the bus not the mechanics
- Down to 1 no start a month; avoids idling which drains the battery
- The myth is that you should start engine warm it up, not true
- One problem with running in cold weather many buses have moisture injection system; 10x more frozen air when you idle the bus versus starting up

Facilitated Discussion:

- Fact sheet dispelling myths
- Retro-fits, auxiliary heaters in engines qualify for EPA grant?
- Information needs to get out to the people paying for these services and shuttles need to be more environmentally conscious
- How to spread costs over a given time; only 3 year contract versus a 5 year contract little incentive to invest
- Reaching out on practical nuts and bolts; need longer contracts to spread costs out over time
- Can't present just an environmental plan; must pay attention to business plan and work within the operator of plan
    - Over arching idea, must be sensitive to the business plan
- Didn't know green transportation options at the airport (lack of information dissemination)
- Paying that premium because you want to; *energy star analogy*
- Calling national fleets; less matching finance and grants than compared to other parts of the country
- Option: cleared out garage space and parked vehicles in garage; saved on gas
    - Recycled oil etc. (safety clam- recycle, reuse…)
    - Set a standard where if you met standard you got to use EPA sticker
    - Map of alternative refueling locations
    - People who put up islands of refueling should be provided some additional incentives
- www.newenglandgas.org information on refueling locations on site
- **MAIN POINT:** disconnect with getting information out to larger audience